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ABSTRACT

A study of new design features for public schools was conducted to determine what specific design features were being implemented in Virginia's schools. This report summarizes the major trends in facility design that were discovered in the following areas: safety and security features; classroom space; technology areas; administrative spaces; communal space; school grounds; teachers' facilities; community use of school facilities; energy use and sustainable design; organization of instruction; and special programs. While numerous innovative design features are being implemented in school across Virginia, the data reveal that older schools built prior to 1990 have fewer of them. Older schools lack some of the benefits of flexible space and extra space for learning, have limited use of landscapes and community access to school assets, and lack central air conditioning. New schools have more cost-saving features and flexible space for instruction, and greater access to the surrounding community. An appendix provides survey statistics. (Contains 11 references.) (GR)

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NEW DESIGN FEATURES IN VIRGINIA'S PUBLIC SCHOOLS

by

Monica McTeague Gillespie
with Beverly Epps, Jacqueline Griesdorn, and Dan Butin

Sponsored by
Creative Office Environments
Bond Comet Westmoreland + Hiner Architects
Thomas Jefferson Center for Educational Design

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Executive Summary

Based on the New Design Features Survey conducted in 1998-1999 by the Thomas Jefferson Center for Educational Design and sponsored by Creative Office Environments and Bond Comet Westmoreland + Hiner Architects, Virginia's public schools are implementing numerous innovative design features in both existing and newly opened buildings. An "educational design feature" is not just a physical feature. It can relate to program or personnel as well. The following list summarizes major trends in educational design.

1) Safety and Security Features
- extra-wide corridors
- controlled access to building
- walkie talkies
- bus security cameras
- modified restrooms
- special landscaping
- alarm systems
- school resource officers (SROs)
- one-way door locks
- barcoded library books
- strategic positioning of administrative offices

2) Classroom Space
- special rooms to accommodate tutorials
- work stations in some classrooms

3) Technology
- computer labs
- computers in most classrooms
- computers in media center
- school-based network
- school-wide internet access
- school/teacher websites
- e-mail for teachers and/or staff
- access to homework hotlines
- closed circuit television
- graphing calculators

4) Organization of Administrative Offices
- administrative offices dispersed throughout the school

5) Communal Space
- cafetoriums
- community areas/commons

6) School Grounds
- gardens (maintained by staff)

7) Facilities for Teachers
- teacher workrooms/resource centers
- teacher lounges

8) Community Use of School Facilities
- computer labs
- gymnasiums
- auditoriums
- outdoor athletic facilities

9) Energy Use and Sustainable Design
- energy saving lighting
- day lighting
- central air conditioning
- recycling programs

10) Organization of Instruction
- team teaching within grades (elementary and middle school)

11) Special Programs
- school/business partnerships
- conflict resolution training
- peer mediation training (middle and high schools)

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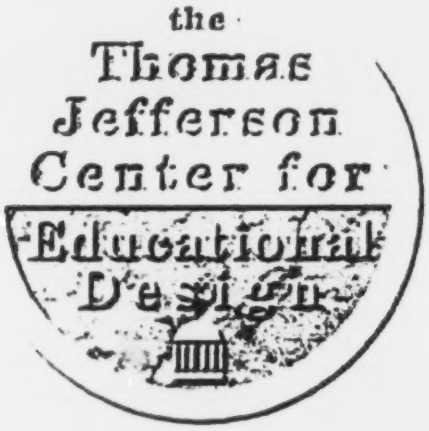

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Introduction

In the 1997-98 fiscal year, Virginia spent over $300 million on school construction and renovation. New schools have been constructed across the state, and old schools have been substantially renovated due to deteriorating facilities and expanding technological needs. In addition to increasing school construction, Virginia's public schools also have expanded programs, added services, and developed innovative programs.

The Thomas Jefferson Center for Educational Design, an interdisciplinary research center at the University of Virginia, conducted a survey of new design features in a stratified sample of Virginia's public schools in 1999. Of the 72 surveys that were mailed to principals, 52 were returned. In all, sixteen elementary, fourteen middle, and twenty-two high schools participated in the study. The project was intended to

1) learn more about design features being implemented in Virginia's schools;
2) develop a survey instrument that can be used periodically to monitor design innovations, and
3) identify schools implementing specific design features.

"This study brings together information from principals in schools throughout the Commonwealth."

This study brings together information from principals in schools throughout the Commonwealth. It allows educators, architects, and designers to learn about new design features being implemented in schools. The mission of the Thomas Jefferson Center for Educational Design is to stimulate awareness of such educational innovations and to encourage their study and assessment.

Safety and Security Features

Various safety and security features were found in all the schools; however, most of the features in the survey were more likely to be found in middle and high schools than in elementary schools. Many elementary schools indicated that they strategically located administrative offices near entrances and/or restrooms. This feature characterized 75% of the schools. Few elementary schools had a school resource officer, but one third of schools reported having telephones in classrooms.

"The addition of a school resource officer was the most significant safety and security feature..."

The addition of a school resource officer (SRO) was the most frequently mentioned safety feature in middle and high schools. Thirty-six of middle schools added an SRO within the last three years. Over half of the high schools also employed at least one SRO. Dewey Cornell, an expert on school safety, outlines the role of the school resource officer in the school. According to Cornell (1998), a school resource officer:

- is a liaison with local law enforcement and works in close coordination with school administrators
- should serve as a valued member of the school staff, working cooperatively with student services personnel (guidance counselors, psychologists, & social workers)
- must be skilled in public relations and maintain a good rapport with students
- must have an educational role in the school
- provides a positive role model and encourages respect for the law

"Over half of the middle schools surveyed lacked telephones in classrooms."

Over half of the middle schools surveyed lack telephones in classrooms. Sixty percent of high schools do not have this safety feature. Telephones in classrooms are an important design feature because they allow teachers to contact outside officials

in emergencies. Teachers also can use telephones to communicate concerns about students with parents, which, in turn, enhances teacher-parent effectiveness in handling problem students.

Other safety and security features present in at least some schools include perimeter fencing, metal detectors, alarm systems, photo identification badges for students, one-way door locks, security cameras, computerized barcode systems for library books, extra-wide corridors, controlled access to buildings, walkie-talkies (used by school administrators), school bus security cameras, modified lockers, modified restrooms, special landscaping, staff identification badges, visitor badges, school safety teams, and parking lot security guards. One school in the sample even installed an emergency buzzer directly linked to the sheriff's office.

Classroom Organization

Survey data reveal a slight change over time in the organization of classrooms at all levels of schooling. More traditional arrangements are being replaced gradually by nontraditional organization of classrooms. Elementary and middle school classrooms organized by grade level and high school classrooms organized by academic discipline are changing to include thematic, interdisciplinary, and family clusters. All these efforts to change the traditional organization of classrooms reflect attempts to integrate the curriculum and to create more personalized learning environments for students.

Elementary Schools -- One in ten schools is moving away from traditional grade-level organization to interdisciplinary, thematic or family-cluster organization.

"Data also indicates a small shift [in middle schools] from the traditional grade-level organization to academic discipline, interdisciplinary, thematic or family-cluster organization."

Middle Schools -- Data indicate a small shift from the traditional grade-level organization to academic discipline, interdisciplinary, thematic or family-cluster organization. Half of all middle schools are organized, in part, based on academic discipline, and approximately one fifth of schools are using thematic, interdisciplinary or family cluster organizations in either all or part of the school.

High Schools -- Data reveal small shift from academic discipline organization to grade-level, thematic, interdisciplinary, or family-cluster organization. A few schools have at least part of the school is organized thematically, interdisciplinary, or by grade level. Other features include interdisciplinary halls, dispersed special education classes, and random assignment of rooms.

Classroom Space

Respondents were asked to describe the classroom spaces and interiors in their schools. Results indicate that classrooms are changing in various ways—tables are replacing desks, display and storage areas are being added, and learning centers are being introduced. These three design features exemplify the growing emphasis on project-based learning. Tables provide space for students to work together in both small and large groups. Display areas throughout classrooms enable teachers and students to exhibit projects while storage areas give students and teachers a place to store their "works in progress." Having learning centers in classrooms also gives students and teachers the opportunity to engage in self-directed learning.

"[T]ables instead of desks, display and storage areas, and learning centers...exemplify the growing emphasis on student projects."

Elementary -- Over one quarter of elementary schools have replaced desks with tables, with slightly more than one fifth of them implementing this feature within the last three years. Over nine out of ten schools have student work stations in their classrooms and learning centers. Approximately 70% have special rooms for tutorials and small groups of students and one fifth of schools have movable walls in classrooms.

Middle School -- Unlike elementary schools, slightly more than one quarter of the middle schools use tables instead of desks in their classrooms. Over three fourths of schools have student work stations in classrooms, and half of schools have created learning centers in classrooms. Half of schools have special rooms for tutorials or small groups of students. Movable walls are present in over one third of schools.

"Over half of [high] schools have special rooms to accommodate tutorials and small groups of students."

High School -- Only one quarter of high schools use tables instead of desks in their classrooms. Over eight out of ten schools have student work stations in classrooms. Learning centers are present in more than a third of schools. Over half of schools have special rooms to accommodate tutorials and small groups of students. Fewer than half of schools have some movable walls separating classrooms.

Technology

Technology is one of the most significant areas for educational innovation because Virginia's Standards of Learning include advanced technology skills. Teachers are implementing innovative programs that incorporate technology into the educational program. New design features in technology cover a wide range of innovations from computer labs to school-wide Internet access. Because of the range of responses for each feature, the data have been organized into the following table.

Table 1: Schools with Technology Features

	ELEMENTARY	MIDDLE	HIGH
Computer Labs	63%	100%	91%
Computers in most classrooms	94%	100%	73%
Computers in media center	94%	100%	100%
Laptop access in most classrooms	6%	14%	14%
Laptop loan program for home use	19%	21%	32%
School-wide internet access	69%	86%	58%
School/teacher website	81%	93%	82%
Access to homework hotlines	63%	64%	32%
Closed-circuit television	50%	64%	68%
School-based network	63%	93%	86%
Email for teachers and/or staff	63%	71%	82%
Email for students	13%	7%	23%
Graphing calculators	50%	93%	100%

Organization of Administrative Offices

The location of administrative offices is an important design feature of a school. Offices located near entrances or restrooms can provide a vital safety feature by increasing adult supervision. The location of offices near student commons or classrooms also facilitates student-administrator interactions. Furthermore, access to guidance counselors is enhanced by dispersing offices throughout the building where students can stop in during the day.

Elementary School -- In a few schools, administrative offices are dispersed throughout the building. One quarter of schools have special rooms for community volunteers, and the same percentage have guidance offices located outside the main office complex.

"Administrative offices are dispersed throughout the building in approximately half of [middle]schools."

Middle School -- Administrative offices are dispersed throughout the building in approximately one half of schools. One third of schools have guidance offices located away from the main office. Less than one tenth of middle schools have special rooms for community volunteers.

High School -- Over half of high schools have administrative offices dispersed throughout the building; however, only 5% of schools have guidance offices dispersed throughout the building. One in five schools have special rooms for community volunteers.

Communal Space

As designers strive to create a sense of community in schools and to provide flexibility and adaptability, schools are increasingly adding multi-purpose spaces. Multi-purpose spaces are also cost-saving features because of their flexibility. They include courtyards, atriums, food courts, student lounges, cafetoriums, and community areas/commons.

Elementary School -- One fifth of schools have an amphitheater and close to 40% have courtyards. Seven in ten schools have a cafetorium and over one third have a commons area. Multipurpose areas are found in almost half of schools.

"Half of middle schools have a cafetorium..."

Middle School -- Amphitheaters are present in less than one quarter of schools while over half have a courtyard. Half of middle schools have a cafetorium and 64% have a commons area. Multipurpose areas are found in one third of schools.

"60% of [high] schools have community/commons areas and multipurpose areas..."

High School -- Courtyards are present in three fourths of schools, and over one in ten have atriums. More than a third of schools have cafetoriums, while three-fifths include commons areas and multipurpose space. One quarter of schools have a food court, but few have a student lounge.

School Grounds

"Outdoor labs are [present] in one tenth of elementary schools and nature trails are in one fifth of schools."

School grounds can provide stimulating learning environments for students and teachers. Cultivating a garden, evaluating water samples from a pond, and creating a nature trail are examples of outdoor learning experiences. Educational landscapes also can support instructional mandates, like Virginia's Standards of Learning, with "cost-effective, on-site resources that enhance classroom learning through engaging, hands-on experiences" (Takahashi, 1999). School grounds foster community and volunteerism through garden design and maintenance, nature trails, and playgrounds. Cooperation among students, teachers, parents, administrators, and community members insures that projects will be sustained over time and become a part of the community.

Elementary School -- Student and/or community gardens are found present in over one third of elementary schools. Staff maintained gardens are in half of schools. Outdoor labs are found in few elementary schools, while 20% boast a nature trail.

Middle School -- Over one third of middle schools have student maintained gardens. One fifth have gardens that are community maintained, and half have staff maintained gardens. One third of schools have nature trails and several have outdoor labs.

High School -- Similar to the middle school data, over one third of schools have student maintained gardens. A third of the schools have community maintained gardens, while close to half of schools with staff maintained gardens. Over a quarter have nature trails and outdoor labs.

Facilities for Teachers

Facilities for teachers are changing as a result of alternative scheduling (e.g. block schedules), increasing need for classroom space, and demands for a more professional environment for teachers. Teachers are faced with increasing demands of high stakes testing and accountability. "Well-designed and equipped workspaces have the potential to enhance communication among teachers, promote an ethos of professionalism, and increase the effectiveness of teachers' efforts to plan and prepare lessons" (Butin, 1999). Facilities for teachers represent important design features. Areas covered in the survey included teacher offices, workrooms, lounges, and separate cafeterias. In the following section, the findings are organized according to level of school.

Table 2: Facilities for Teachers

	ELEMENTARY	MIDDLE	HIGH
Private offices for some teachers	31%	43%	41%
Teacher offices shared by department	13%	21%	59%
Teacher offices shared by grade level	13%	43%	5%
Teacher offices shared by team	13%	21%	5%
Teacher workroom/resource room	75%	71%	86%
Teachers' cafeteria	19%	43%	41%
Teachers' lounge	88%	71%	73%

Community Use of School Facilities

As communities construct new schools and renovate old buildings, issues concerning community use of school facilities surface, especially as construction costs rise. Community members u: ' such school facilities as cafetoriums, playgrounds, parking lots (skateboarding, rollerblades), commons areas, multipurpose rooms, faculty dining areas, and auditoriums.

Table 3: Community Use of School Facilities

	ELEMENTARY	MIDDLE	HIGH
Community library at school	25%	0%	5%
Public access to school library	63%	29%	36%
Day care in school	6%	0%	5%
Adult education classes	19%	7%	59%
Computer lab	50%	43%	68%
Gymnasium	81%	100%	96%
Public performances in school auditorium	56%	71%	77%
Public access to outdoor athletic fields	69%	93%	82%

Energy Use and Sustainable Design

Issues related to energy use and sustainable design are often at the forefront of planning new construction and renovating existing buildings. Studies have shown that day lighting, for example, increases student performance (McClintock, 1996; McGuffy, 1982). In addition, as school districts move toward year-round use of school facilities for enrichment and remedial programs, the need for air conditioning becomes critical. Survey results indicate widespread use of many energy saving features.

Table 4: Energy Use and Sustainable Design

	ELEMENTARY	MIDDLE	HIGH
Energy saving lighting	50%	57%	32%
Multilevel lighting	19%	36%	32%
Day lighting	75%	64%	41%
Central air conditioning	56%	79%	68%
Air conditioning units in most classrooms	31%	29%	55%
Air conditioning units in offices only	38%	36%	32%
Geothermal heating	13%	7%	14%
Humidity sensors	38%	14%	18%
CO2 monitors	19%	14%	23%
Recycling program	75%	79%	64%

Organization of Instruction

In an attempt to increase instructional time, provide more planning time for teachers, and create more personal learning environments, schools across Virginia have changed the organization of instruction. Block scheduling and modified block scheduling are being used in elementary, middle and high schools. Innovative configurations of time also allow for collaborative learning, common planning periods for teams of teachers, and additional time for remedial intervention for students. There is also a trend towards specialization by subject matter. For example, half of elementary schools and one fifth of middle schools have different subjects taught by different teachers. In table 5, the range of K-12 scheduling alternatives is presented.

Table 5: Organization of Instruction

	ELEMENTARY	MIDDLE	HIGH
4x4 block schedule	6%	0%	27%
Modified block schedule	25%	14%	5%
AB schedule	6%	0%	27%
Modified AB schedule	6%	14%	9%
Self contained classrooms	81%	14%	5%
6 period day	6%	14%	5%
7 period day	0%	57%	27%
8 period day	0%	7%	0%
Extended day program	19%	14%	5%

Schools are also implementing innovative design features in instruction to encourage collaboration among teachers. Arrangements include team teaching, teacher looping, and nontraditional student grouping. While the majority of schools with these features are found at the elementary level, there is some indication that these innovations are also being tried in middle and high schools.

Table 6: Alternative Organizations of Instruction

	ELEMENTARY	MIDDLE	HIGH
Team teaching across grades	13%	14%	14%
Team teaching within grades	50%	72%	18%
Teacher looping within school	25%	7%	9%
Teacher looping between schools	0%	0%	5%
Multiage classrooms	19%	7%	NA
Family grouping	6%	0%	0%

Special Programs

Early Childhood Education -- With statewide emphasis on early childhood education, schools are implementing programs designed to support pre-kindergarten children. Through these programs, student, especially those identified as "at-risk," are developing the skills they need in order to be successful. Head Start is in 13% of elementary schools. Almost half of elementary schools have a full day early childhood education program, while a quarter have a 4-year-old preschool program. Half of elementary schools have preschool special education programs.

Vocational and Career Education

Educators are addressing vocational and career education with innovative programs and partnerships. Schools at all levels are developing business partnerships to provide the necessary technology and stimulate community volunteerism. The increasing demand for technologically skilled graduates is also driving these vocational and career innovations.

Table 7: Vocational and Career Education

	ELEMENTARY	MIDDLE	HIGH
Apprenticeship program	0%	14%	36%
School-to-work program	6%	7%	55%
Work/study placements	13%	7%	68%
School/business partnerships	50%	64%	86%
Pairing of academic and vocational classes	0%	21%	64%
Dual enrollment	0%	7%	73%

Other Special Programs

In addition to innovative vocational and career education programs, many schools reported that they offered a variety of special programs for their students. These programs range from conflict resolution to programs for teen parents. Some schools also provide on-site services for their students. One fifth of middle schools and 5% of high schools have social services offices in their buildings. Probation offices are in less than one tenth of elementary schools, one fifth of middle schools, and one tenth of high schools. Medical offices, other than the school nurse, are in less than one tenth of middle and high schools.

Table 8: Special Programs

	ELEMENTARY	MIDDLE	HIGH
Conflict resolution training	50%	64%	59%
Peer mediation training	38%	86%	68%
Values/character education	69%	29%	23%
Community service requirement	0%	7%	9%
Dropout prevention program	19%	36%	59%
Special summer programs (enrichment and remedial)	69%	50%	27%
Homework assistance center in school	13%	21%	27%
9th grade transition program	NA	29%	18%
Program for pregnant teens	6%	21%	45%
Program for teen parents	6%	21%	50%

Trends

The New Design Features Survey revealed several significant trends. A trend represents the implementation of a design feature in at least half of the schools in the survey.

1) Safety and Security Features
- extra-wide corridors
- controlled access to building
- walkie talkies
- bus security cameras
- modified restrooms
- special landscaping
- alarm systems
- school resource officers (SROs)
- one-way door locks
- barcoded library books
- strategic positioning of administrative offices

2) Classroom Space
- special rooms to accommodate tutorials
- work stations in some classrooms

3) Technology
- computer labs
- computers in most classrooms
- computers in media center
- school-based network
- school-wide internet access
- school/teacher websites
- e-mail for teachers and/or staff
- access to homework hotlines
- closed circuit television
- graphing calculators

4) Organization of Administrative Offices
- administrative offices dispersed throughout schools

5) Communal Space
- cafetoriums
- community areas/commons

6) School Grounds
- gardens (maintained by staff)

7) Facilities for Teachers
- teacher workrooms/resource centers
- teacher lounges

8) Community Use of School Facilities
- computer labs
- gymnasiums
- auditoriums
- outdoor athletic facilities

9) Energy Use and Sustainable Design
- energy saving lighting
- day lighting
- central air conditioning
- recycling programs

10) Organization of Instruction
- team teaching within grades (elementary and middle school)

11) Special Programs
- school/business partnerships
- conflict resolution training
- peer mediation training (middle and high schools)

Old and New Schools

While the survey reveals that numerous innovative design features are being implemented in schools across the Commonwealth, it also indicates that there are places where few innovations have been attempted. Older schools, those built prior to 1990, are less likely to have many of the features being included in new schools. Safety features such as telephones in classrooms are in half of all new schools, but only a quarter of old schools. In less than half the old schools are found administrative offices strategically located near entrances or restrooms.

Old schools also lack some of the benefits of flexible space and extra space for learning. Movable walls between some classrooms, a feature present in over half of new schools, are found in slightly more than a quarter of older middle and high schools. Special rooms for tutorials and small groups of students, which can serve a vital function in the educational program, are found in fewer than half of old schools. Old schools also lack community areas/commons and multipurpose areas. The use of educational landscapes is also limited; nature trails, a part of the grounds at more than half of new schools, are virtually nonexistent in old schools. New schools are also more likely to provide community access to computer labs and other school facilities.

Lack of air conditioning further illustrates the disparity between older and newer schools. Over half of older high schools lack central air conditioning. Close to seventy percent of older elementary and forty percent of older

middle schools lack central air conditioning, a fact which can negatively impact the instructional program. In another Jefferson Center study, Virginia superintendents reported that between 1996- 1998, schools "lost more than 38 days of instruction due to lack of air conditioning and have been forced to dismiss school early due to hot weather on more than 40 occasions" (Duke & Griesdorn, 1998). Older schools also are less likely to have energy saving lighting, a significant cost-saving feature.

New schools clearly have more cost-saving features and flexible space for instruction, as well as greater access for the entire community. If we are to provide an equitable education for all Virginia's students, we need to evaluate the conditions of older schools and fund the renovation of obsolete or deteriorating facilities.

Conclusion

As Virginia continues to build new schools and renovate existing facilities, educators and architects have the opportunity to create places where children can and *want* to learn. Innovative design features, such as special rooms for tutorial and small group meetings, provide places for learning that augment traditional classrooms. Given the "high stakes" context in which today's schools exist, educators and architects need to consider a variety of design features that provide safety, facilitate learning, and reduce unnecessary expenses. The Thomas Jefferson Center for Educational Design is dedicated to providing these individuals up-to-date information on innovations in educational design.

Additional Resources

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McGuffy, C.W. (1982). Facilities. In H.J. Walberg (Ed.) *Improving educational standards and productivity* (pp.237-288). Berkeley: McCutchan.

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APPENDIX A

Survey

The survey was designed by researchers at the Thomas Jefferson Center for Educational Design. Experts in education and architecture reviewed the instrument and validated the questions. In February 1999, the survey was mailed to 72 school principals. The school sites were randomly chosen from subsets of schools divided according to the following categories: a) age of school (old or new); b) level of school (elementary, middle, high); c) location of school (urban, rural, suburban). Schools built within the last ten years were considered to be "new." Respondents completed the survey by whether or not each design feature was currently in place and if it had been implemented in the last three years. Of the 72 surveys that were mailed, 52 were returned, resulting in a 72% response rate. Table 9 shows the categories of respondents.

Table 9: Number of Participating Schools

Age of School	Level	Location of School			Total
		Urban	Rural	Suburban	
old	elementary	3	3	3	9
	middle	1	4	3	8
	high	3	4	4	11
	total	7	11	10	28
new	elementary	2	3	2	7
	middle	0	3	3	6
	high	3	6	2	11
	total	5	12	7	24